

Application No. 10/718,884  
Response to Office Action

Customer No. 01933

**Listing of Claims:**

1. (Currently Amended) An illumination apparatus for a microscope, comprising:

a light source for white light;

beam splitting means for splitting a light beam emitted from  
5 the light source into a plurality of beams of irradiation light;

wavelength-selective means, including a plurality of  
wavelength-selective members which are provided on respective  
optical paths of the beams of irradiation light split by the beam  
splitting means, for selecting wavelengths of the beams of  
10 irradiation light;

light-amount adjusting means, including a plurality of  
light-amount adjusting members which are provided on the  
respective optical paths of the beams of irradiation light split  
by the beam splitting means, for adjusting intensities of the  
15 plurality of beams of irradiation light; and

beam synthesizing means for synthesizing the plurality of  
beams of irradiation light whose wavelengths are selected, into a  
single light beam.

2. (Currently Amended) An illumination apparatus for a microscope, comprising:

a light source for white light;

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beam splitting means for splitting a light beam emitted from  
5 the light source into beams of first irradiation light and second  
irradiation light;

a first wavelength-selective ~~means~~ member for selecting a  
wavelength of the first irradiation light;

10 a first light-amount adjusting member for adjusting an  
intensity of the first irradiation light;

a second wavelength-selective ~~means~~ member for selecting a  
wavelength of the second irradiation light;

a second light-amount adjusting member for adjusting an  
intensity of the second irradiation light; and

15 beam synthesizing means for synthesizing the beams of the  
first irradiation light whose wavelength is selected and the  
second irradiation light whose wavelength is selected, into a  
single light beam.

3. (Currently Amended) An illumination apparatus for a  
microscope, comprising:

a light source for white light;

5 beam splitting means for splitting a light beam emitted from  
the light source into a plurality of beams of irradiation light;

wavelength-selective means, including a plurality of  
wavelength-selective members which are provided on respective  
optical paths of the beams of irradiation light split by the beam

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splitting means, for selecting wavelengths of the beams of  
10 irradiation light;  
light-amount adjusting means, including a plurality of  
light-amount adjusting members which are provided on the  
respective optical paths of the beams of irradiation light split  
by the beam splitting means, for adjusting intensities of the  
15 plurality of beams of irradiation light;  
beam synthesizing means for synthesizing the plurality of  
beams of irradiation light whose wavelengths are selected, into a  
single light beam;  
a mirror for introducing the light beam synthesized by the  
20 beam synthesizing means in a direction in which a specimen is  
irradiated and for transmitting light from the specimen;  
an objective lens interposed between the mirror and the  
specimen;  
imaging elements for imaging fluorescent light from the  
25 specimen, which passes through the objective lens and the mirror,  
after the fluorescent light is separated into fluorescent light  
excited by individual wavelengths; and  
image processing means for processing fluorescent images  
formed by the imaging elements.

4. (Currently Amended) An image processing apparatus using  
an illumination apparatus, the illumination apparatus comprising:

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a light source for white light;

beam splitting means for splitting a light beam emitted from  
5 the light source into a plurality of beams of irradiation light;

wavelength-selective means, including a plurality of  
wavelength-selective members which are provided on respective  
optical paths of the beams of irradiation light split by the beam  
splitting means, for selecting wavelengths of the beams of  
10 irradiation light;

light-amount adjusting means, including a plurality of  
light-amount adjusting members which are provided on the  
respective optical paths of the beams of irradiation light split  
by the beam splitting means, for adjusting intensities of the  
15 plurality of beams of irradiation light;

beam synthesizing means for synthesizing the plurality of  
beams of irradiation light whose wavelengths are selected, into a  
single light beam;

a mirror for introducing the light beam synthesized by the  
20 beam synthesizing means in a direction in which a specimen is  
irradiated and for transmitting light from the specimen;

an objective lens interposed between the mirror and the  
specimen;

imaging elements for imaging fluorescent light from the  
25 specimen, which passes through the objective lens and the mirror,

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after the fluorescent light is separated into fluorescent light  
excited by individual wavelengths; and

image processing means for processing fluorescent images  
formed by the imaging elements.

5. (Currently Amended) An illumination apparatus for a  
microscope, comprising:

a light source for white light;

beam splitting means for splitting a light beam emitted from  
5 the light source into two beams of first irradiation light and  
second irradiation light;

a first wavelength-selective ~~means~~ member for selecting a  
wavelength of the first irradiation light;

10 a first light-amount adjusting member for adjusting an  
intensity of the first irradiation light;

a second wavelength-selective ~~means~~ member for selecting a  
wavelength of the second irradiation light;

a second light-amount adjusting member for adjusting an  
intensity of the second irradiation light;

15 beam synthesizing means for synthesizing the beams of the  
first irradiation light whose wavelength is selected and the  
second irradiation light whose wavelength is selected, into a  
single light beam;

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20 a mirror for introducing the light beam synthesized by the  
beam synthesizing means in a direction in which a specimen is  
irradiated and for transmitting light from the specimen;

an objective lens interposed between the mirror and the  
specimen;

25 imaging elements for imaging fluorescent light from the  
specimen, which passes passing through the objective lens and the  
mirror, after the fluorescent light is separated into fluorescent  
light excited by a first wavelength and fluorescent light excited  
by a second wavelength; and

30 image processing means for processing fluorescent images  
formed by the imaging element.

6. (Currently Amended) An image processing apparatus using  
an illumination apparatus, the illumination apparatus comprising:

a light source for white light;

5 beam splitting means for splitting a light beam emitted from  
the light source into two beams of first irradiation light and  
second irradiation light;

a first wavelength-selective ~~means~~ member for selecting a  
wavelength of the first irradiation light;

10 a first light-amount adjusting member for adjusting an  
intensity of the first irradiation light;

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a second wavelength-selective means member for selecting a wavelength of the second irradiation light;

a second light-amount adjusting member for adjusting an intensity of the second irradiation light;

15 beam synthesizing means for synthesizing the beams of the first irradiation light whose wavelength is selected and the second irradiation light whose wavelength is selected, into a single light beam;

20 a mirror for introducing the light beam synthesized by the beam synthesizing means in a direction in which a specimen is irradiated and for transmitting light from the specimen;

an objective lens interposed between the mirror and the specimen;

25 imaging elements for imaging fluorescent light from the specimen, which passes through the objective lens and the mirror, after the fluorescent light is separated into fluorescent light excited by a first wavelength and fluorescent light excited by a second wavelength; and

30 image processing means for processing fluorescent images formed by the imaging element.

Claims 7-10 (Canceled).

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11. (Currently Amended) An illumination apparatus for a microscope according to claim 1 or 3 or 7, further comprising wherein at least one of the plurality of light-amount adjusting means for adjusting an intensity of at least one of the plurality  
5 of beams of irradiation light members is movable in and out of the optical path on which it is provided.

12. (Currently Amended) An image processing apparatus according to claim 4 or 8, wherein ~~the illumination apparatus further comprises~~ at least one of the plurality of light-amount adjusting means for adjusting an intensity of at least one of the  
5 plurality of beams of irradiation light members is movable in and out of the optical path on which it is provided.

13. (Currently Amended) An illumination apparatus for a microscope according to claim 2 or 5 or 9, further comprising wherein at least one of ~~(a)~~ the first light-amount adjusting means for adjusting an intensity of the first irradiation light  
5 member and (b) the second light-amount adjusting means for adjusting an intensity of the second irradiation light member is movable in and out of a split optical path from the beam splitting means.



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14. (Currently Amended) An image processing apparatus according to claim 6 ~~or 10~~, wherein ~~the illumination apparatus further comprises at least one of: (a) the first light-amount adjusting means for adjusting an intensity of the first~~  
5 ~~irradiation light member and (b) the second light-amount adjusting means for adjusting an intensity of the second~~  
~~irradiation light member is movable in and out of a split optical path from the beam splitting means.~~

15. (Withdrawn - Currently Amended) An illumination apparatus for a microscope according to claim 3 ~~or 7~~, further comprising polarization direction selective means for selecting a polarization direction of at least one of the plurality of beams of irradiation light.

16. (Withdrawn - Currently Amended) An image processing apparatus according to claim 4 ~~or 8~~, wherein the illumination apparatus further comprises polarization direction selective means for selecting a polarization direction of at least one of the plurality of beams of irradiation light.

17. (Withdrawn - Currently Amended) An illumination apparatus for a microscope according to claim 5 ~~or 9~~, further comprising at least one of: (a) first polarization direction

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5 selective means for selecting a polarization direction of the first irradiation light and (b) second polarization direction selective means for selecting a polarization direction of the second irradiation light.

Claim 18 (Canceled).

19. (Currently Amended) An illumination apparatus for a microscope according to claim 3 ~~or 7~~, further comprising wavelength distribution monitoring means for monitoring a wavelength distribution of at least one of the plurality of beams of irradiation light.

20. (Currently Amended) An image processing apparatus according to claim 4 ~~or 8~~, wherein the illumination apparatus further comprises wavelength distribution monitoring means for monitoring a wavelength distribution of at least one of the plurality of beams of irradiation light.

21. (Currently Amended) An illumination apparatus for a microscope according to claim 5 ~~or 9~~, further comprising wavelength distribution monitoring means for monitoring at least one of: a wavelength distribution of the first irradiation light and a wavelength distribution of the second irradiation light.

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22. (Currently Amended) An image processing apparatus according to claim 6 ~~or 10~~, wherein the illumination apparatus further comprises wavelength distribution monitoring means for monitoring at least one of: a wavelength distribution of the first irradiation light and a wavelength distribution of the second irradiation light.

23. (Previously Presented) An illumination apparatus for a microscope according to claim 3 or 5, wherein the mirror comprises a semi-transmissive mirror.

24. (Previously Presented) An image processing apparatus according to claim 4 or 6, wherein the mirror comprises a semi-transmissive mirror.

25. (Withdrawn - Currently Amended) An illumination apparatus for a microscope according to ~~any one of claims~~ claim 3 ~~[[,]] or 5, 7, or 9,~~ wherein the beam splitting means and the beam synthesizing means comprise dichroic mirrors.

26. (Withdrawn - Currently Amended) An image processing apparatus according to ~~any one of claims~~ claim 4 ~~[[,]] or 6, 8, or 10,~~ wherein the beam splitting means and the beam synthesizing means comprise dichroic mirrors.

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27. (Withdrawn - Currently Amended) An illumination apparatus for a microscope according to ~~any one of claims~~ claim 3 ~~[[,]] or 5, 7, or 9,~~ wherein the beam splitting means and the beam synthesizing means comprise polarization beam splitters.

28. (Withdrawn - Currently Amended) An image processing apparatus according to ~~any one of claims~~ claim 4 ~~[[,]] or 6, 8, or 10,~~ wherein the beam splitting means and the beam synthesizing means comprise polarization beam splitters.

29. (Currently Amended) An illumination apparatus for a microscope according to claim 3 ~~or 7,~~ wherein ~~the wavelength-selective means comprises a plurality of wavelength-selective means,~~ at least one of which the plurality of wavelength-selective members is movable in and out of an the optical path ~~split by the beam splitting means on which it is provided.~~

30. (Currently Amended) An image processing apparatus according to claim 4 ~~or 8,~~ wherein ~~the wavelength-selective means comprises a plurality of wavelength-selective means,~~ at least one of which the plurality of wavelength-selective members is movable in and out of an the optical path ~~split by the beam splitting means on which it is provided.~~

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31. (Currently Amended) An illumination apparatus for a microscope according to claim 5 ~~or 9~~, wherein at least one of the first wavelength-selective ~~means~~ member and the second wavelength-selective ~~means~~ member is movable in and out of an optical path split by the beam splitting means.

32. (Currently Amended) An image processing apparatus according to claim 6 ~~or 10~~, wherein at least one of the first wavelength-selective ~~means~~ member and the second wavelength-selective ~~means~~ member is movable in and out of an optical path split by the beam splitting means.

33. (Currently Amended) An illumination apparatus for a microscope, comprising:

a light source for white light;

beam splitting means for splitting a light beam emitted from  
5 the light source into a plurality of beams of illumination light;

wavelength-selective means, provided on at least one of a plurality of optical paths of the beams of illumination light split by the beam splitting means, for selecting wavelengths of the beams of illumination light;

10 light-amount adjusting means, including a plurality of light-amount adjusting members which are provided on respective optical paths of the beams of illumination light split by the

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beam splitting means, for adjusting intensities of the plurality of beams of illumination light;

15 beam synthesizing mean for synthesizing the plurality of beams of illumination light whose wavelengths are selected, into a single light beam;

optical elements that introduce the light beam synthesized by the beam synthesizing means to a specimen;

20 image pickup elements that separately pick up, out of light beams for observation emitted from the specimen, light beams for observation generated by irradiation with illumination light of different wavelengths that is separated by wavelength; and

image processing means for processing images for observation  
25 picked up by the image pickup elements.

34. (Currently Amended) An image processing apparatus using an illumination apparatus, the illumination apparatus comprising:  
a light source for white light;

beam splitting means for splitting a light beam emitted from  
5 the light source into a plurality of beams of illumination light;

wavelength-selective means, provided on at least one of a plurality of optical paths of the beams of illumination light split by the beam splitting means, for selecting wavelengths of the illumination light;

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- 10        light-amount adjusting means, including a plurality of  
light-amount adjusting members which are provided on respective  
optical paths of the beams of illumination light split by the  
beam splitting means, for adjusting intensities of the plurality  
of beams of illumination light;
- 15        beam synthesizing mean for synthesizing the plurality of  
beams of illumination light whose wavelengths are selected, into  
a single light beam,
- optical elements that introduce the light beam synthesized  
by the beam synthesizing means to a specimen;
- 20        image pickup elements that separately pick up, out of light  
beams for observation emitted from the specimen, light beams for  
observation generated by irradiation with illumination light of  
different wavelengths that is separated by wavelength; and  
image processing means for processing images for observation
- 25        picked up by the image pickup elements.